ADEQ Arizona Department of Environmental Quality

TECHNICAL SUPPORT DOCUMENT

PROPOSED UNDERGROUND STORAGE TANK (UST) RELEASE CASE CLOSURE EVALUATION SUMMARY

LUST Case File #: 2510.01
Facility ID # 0-004996
Maricopa County

Phoenix Pest Control
2911 North 26th Avenue
Phoenix, Arizona 85017

Background:
The Site is located at 2911 North 26th Avenue in Phoenix, Arizona and is currently Phoenix Pest & Termite Control, which was formerly Phoenix Pest Control, Inc. (Phoenix Pest). The Site is located near Grand Avenue and Thomas Road. The Site is bounded by large storm-water retention basins to the north, west and south. An automotive body and paint shop is located directly east of the Site.

Phoenix Pest utilized one steel 1,000-gallon underground storage tank (UST) and a single suction-type dispenser for fueling of fleet vehicles until 1992. The primary compounds of concern (COCs) are the volatile organic compounds (VOCs) benzene, toluene, and methyl-tert-butyl ether (MTBE). Brown and Caldwell (B&C) stated in the March 2000 Site Characterization Report that a fuel release from the UST system had impacted soil with benzene, toluene, ethylbenzene, and xylene (BTEX) and petroleum hydrocarbons. BTEX and MTBE are evaluated as COCs for closure purposes based on the March 2000 Site Characterization Report and the additional Site Characterization performed by Wood Environmental & Infrastructure Solutions, Inc. (Wood) formerly known as Amec Foster Wheeler, Inc. (Amec Foster Wheeler) in February 2018.

When the original characterization was performed, VOCs such as trimethylbenzene (TMB) and tetraethyl lead (TEL) were not routinely analyzed. The re-characterization was used to characterize the nature and extent of these additional ADEQ required compounds. The soil impact above minimum soil cleanup levels extends from 25 feet (ft.) below ground surface (bgs) to 105 ft. bgs. The extent of the groundwater contamination of benzene and toluene was limited to the area around MW-1 and defined by MW-2 and MW-3. Four additional wells including MW-4 and MW-5 (onsite), and MW-6 and MW-7 (offsite) were installed in 2018 to further define the lateral and vertical extent of the groundwater contamination.

On-site corrective actions (e.g. remediation) have been performed for the saturated zone soil and groundwater at the Site from 124 to 160 feet ft bgs. The corrective actions have involved in-situ chemical oxidation (ISCO) injections. Quarterly groundwater sampling was also performed to monitor the effectiveness of the on-site corrective actions.

Removal or control of the source of contamination:
Source control has been completed by the UST system being permanently removed in 1992. During the excavation, evidence of a fuel release was observed. The total volume and timeframe of the release is unknown. Corrective actions included additional contaminant characterization work, remediation, and groundwater monitoring activities.

The dissolved phase VOCs in groundwater were treated through ISCO injections of PersulfOx® at one source area monitoring well and four injection wells including MW-1, and IW-1, IW-2, IW-3, and IW-4 between October 2018 and February 2019. A reduction of overall groundwater

contaminant concentrations has been observed indicating a significant reduction in on-site contaminant mass.

Characterization of the groundwater plume:
The initial pre-ISCO groundwater sampling performed in June 2018 indicated that a dissolved phase contaminant plume extended 50 feet to the northwest and 40 feet southwest from the source area. The up gradient extent was defined by MW-4 located 50 ft southeast and cross gradient and MW-5 (on site adjacent to the auto body and repair shop) located up gradient 95 ft to the northeast. The maximum reported concentrations of benzene and MTBE during the June 2018 and March 2020 event respectively, were at well MW-1: Benzene at 670 µg/L and at 6.0 µg/L; MTBE at 36,000 µg/L and at 71 µg/L. MW-1 is located nearest the source area and has exhibited an overall decline in both these contaminants. Benzene remains slightly elevated above the AWQS of 5 ug/L and MTBE is below the Tier 1 guidance level of 94 ug/L.

Groundwater plume stability:
The only VOC that remaining above a regulatory standard in groundwater at the site is benzene in source area well MW-1. MTBE was detected in wells near the source area at MW-1, IW-3, and IW-4, and at MW-3 located near the northwest site boundary. Monitoring wells also were installed offsite down gradient and cross-gradient (MW-6 and MW-7, respectively) to further delineate the extent of contamination. Groundwater sampling of these wells indicated no presence of benzene and minimal concentrations of MTBE (less than 5 µg/L).

Remedial corrective actions consisting of two PersulfOx® treatments were performed on October 9, 2018 and February 13, 2019. Groundwater plume stability occurs when the dissolved contaminant mass is in equilibrium with the remaining source mass, which includes the vadose zone and sorbed non-aqueous phase liquids (NAPL).

Trends at locations near the source area that continue to exhibit benzene and/or MTBE concentrations above the AWQS or Tier I Guidance Level indicate an overall stability and decline from original concentrations. A statistical analysis was used to evaluate benzene and MTBE analytical results from the reporting period. The analysis utilized a Mann-Kendall test that is used to define the stability of a contaminant plume based on concentration trends at individual wells. The test compares each sampling event to another event for a specified contaminant to identify contaminant trends. The Phoenix Pest data set consisted of a total of eight sampling events evaluated for benzene and MTBE. The non-detect sample results had different reporting limits which creates inconsistent comparisons. Each non-detect analytical result was given a 0.5 µg/L value in the Mann-Kendall test and variance calculations. This eliminated any anomalous increase or decreases in the analysis.

Benzene and MTBE are contaminants that have been over or elevated near the AWQS or screening level during the reporting period. Concentrations from the last two events (January 2020 and March 2020), show an overall decrease in concentrations. The statistical evaluation displays a decreasing trend with greater than or equal to (≥) 90% confidence level in benzene concentrations at MW-2 and MW-3. No trend was identified at MW-4, IW-1, IW-2, IW-3, and IW-4 due to benzene concentrations being below laboratory reporting limits. The only well location that displayed an increasing trend in benzene concentrations was at MW-1, which can

be attributed to the rebound during the October 2019 sampling event and the decline in the March 2020 sampling event. The statistical analysis displays an overall decreasing trend from the maximum concentration of 670 µg/L (June 2018). The statistical evaluation displays a decreasing trend in MTBE concentrations at MW-1, MW-2, MW-3, MW-4, and IW-2.

Groundwater generally flows in a westerly to southwesterly direction. The analytical data collected from the monitoring well network indicates that the benzene plume is limited in extent to the area of MW-1, thus indicating the plume has not migrated off-site.

Natural Attenuation:
Natural attenuation processes include diffusion, dispersion, sorption, volatilization, and biodegradation. A decreasing trend in VOC concentrations in groundwater has been established, which supports that natural attenuation is occurring. Hydrologic and geochemical data can be used to indirectly demonstrate the type(s) of natural attenuation processes.

The primary line of evidence for natural attenuation is decreasing contaminant concentration trends. Based on a review of groundwater analytical data and results of the Mann-Kendall Toolkit, a decreasing trend of COC concentrations in groundwater is well documented in all wells. This data analysis, in conjunction with the BIOSCREEN evaluation (see description below) supports the primary line of evidence for occurrence of natural attenuation.

The BIOSCREEN Natural Attenuation Decision Support System was developed by the Air Force Center for Environmental Excellence (AFCEE) to be used to defend this conclusion. The BIOSCREEN model requires input of field analytical data and aquifer characteristics. Dissolved Oxygen (DO), which is a key indicator of ISCO performance and natural attenuation, was measured during each groundwater monitoring event.

The input parameters for the BIOSCREEN models for benzene are included in Appendix D. As previously indicated, benzene has not been detected above 5.0 µg/L in a well located down gradient of MW-1. The simulation time was varied until benzene decreased below 5.0 µg/L in MW-1, which occurred in less than 30 years. However, based on first-order decay and instantaneous reaction rates, the model result predicts that dissolved benzene plume above 5.0 µg/L will not extend more than five feet down gradient of MW-1, which matches the field data. As previously indicated, MTBE has not been detected above 94 µg/L in a well located down gradient of MW-3. However, based on first-order decay and instantaneous reaction rates, the model results show that dissolved MTBE plume above 94 µg/L should not extend more than ten ft down gradient of MW-3, which matches the field data.

Threatened or impacted drinking water wells:
On February 2018, Wood performed a survey of potential receptors located with 0.25 miles of MW-1 and is included in the LUST Site Characterization Report. The search radius was expanded to 0.50 miles for exposure evaluations post corrective action completion. A search of Arizona Department of Water Resources (ADWR) records identified one Arizona Public Services (APS) well within the radius which was abandoned. Per ADWR records, the remaining wells are identified as monitoring or specialty wells (not domestic wells, municipal, or irrigation

wells). The City of Phoenix (COP) Water Services Department supplies potable water to the area and there are no City production wells within the search radius.

There are two mobile home parks [MHP] (Bel-Air/Pecan Grove MHP and Vagabond MHP) within the search radius. Bel-Air MHP is located approximately ½ mile to the northwest of the Site and the Vagabond MHP is located to the southeast of the Site on the east side of I-17. These MHPs are not listed in the ADEQ Safe Drinking Water Database for registered water systems. Wood searched for property information and on a rental service page, it states City water for both parks. According to a sales posting on LoopNet, Bel-Air / Pecan were once two separate properties built in the 1950's and on city services. According to https://www.phoenix.gov/atyourservice, there is existing service at both addresses to set-up a new account.

The COP operates a regulated public water system (AZ04-0725) that services the area around the Phoenix Pest site. Currently the COP uses mainly surface water [Salt River Project (SRP) reservoirs and the Colorado River] as its main source of drinking water. Nearly 50% comes from the Colorado River, which may begin to have shortages as soon as 2020 according to the Bureau of Reclamation. Because of this, COP views all water within their service area boundary as a potential water supply source in the event that Colorado River allocations are curtailed during a drought declaration.

According to ADWR rules, any new or replacement well located at or near the LUST site would need to meet the criteria of A.A.C. R12-15-1302 (B) (3).

Other exposure pathways:
Other exposure pathways include exposure to hydrocarbon constituents through dermal contact, ingestion of soils, or inhalation of vapors through vapor intrusion. The residual soil impact above ADEQ's Residential Soil Remediation Levels (rSRLs) extends from 25 to 105 ft bgs, which is identified as subsurface soil. During the additional site characterization, nine soil borings were advanced to further define the vertical and lateral extent of the on-site contamination. Soil samples were collected at designated intervals as noted in the Phoenix Pest Site Characterization Report The only analytes that exceeded SRLs in collected soil samples were benzene, naphthalene (also reported as a PAH), toluene, xylene, 1,2,4-trimethylbenzene (1,2,4-TMB), and 1,3,5-trimethylbenzene (1,3,5-TMB). The maximum vertical extent of the soil impact above laboratory non-detect is the groundwater table at 145 ft bgs.

A Tier 3 Vapor Intrusion (VI) Risk Evaluation was submitted to ADEQ by Wood on May 1, 2018. The findings presented in this report showed no carcinogenic risks for the building periphery.

The Site characterization data has indicated that VOCs are not present above minimum remediation levels in the surface soils (≤ 15 ft bgs). The Site characterization data and subsequent VI assessment have also indicated that VOCs in the subsurface vadose zone soils have been sufficiently decreased to concentrations that do not represent exposure threats, including groundwater and vapor intrusion to indoor air. Therefore, the exposure pathways are considered incomplete.

A search for sensitive receptors (e.g.; a hospital, school, or daycare) within a 0.25 mile radius was performed. None were reported. The nearest surface water body is the SRP Grand Canal, which is located approximately 0.5 miles north and up gradient of the Site. Therefore, the Grand Canal is not threatened by limited remaining contamination at the Phoenix Pest LUST site.

Requirements of A.R.S. §49-1005(D) and (E):
The results of the corrective action completed at the site assure protection of public health, welfare and the environment. To the extent practicable, the clean-up activities competed at the site allow for the maximum beneficial use of the site, while being reasonable, necessary and cost effective.

Other information that is pertinent to the LUST case closure approval:
The facility and LUST files were reviewed for information regarding prior cleanup activities, prior site uses, and operational history of the UST system prior to removal.

Groundwater data tables representing source area, down gradient, and up gradient conditions:

MW-1 (UST basin)
Total Depth: 157 feet. Screened 117-157 feet.

Date	**Benzene AWQS is 5.0 µg/L**	**MTBE Tier 1 Corrective Action Standard 94 µg/L**	**Depth to Water (feet)**
November 2017	**480**	**4,300**	149.64
June 2018	**670**	**36,000**	143.08
October 2018 ISCO			
November 2018	<1.2	**1,800**	142.87
January 2019	2.5	**400**	142.98
February 2019 ISCO			
March 2019	2.3	**130**	142.85
April 2019	<0.12	12	142.84
July 2019	<0.12	3.1	142.55
October 2019	**15**	3.6	
January 2020	**25**	**300**	141.82
March 2020	**6**	71	141.40

MW-2 (on-site; down gradient of UST basin)
Total Depth: 165 feet. Screened 125-165 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard 94 µg/L	Depth to Water (feet)
December 2017	1.3	65	142.14
June 2018	**7.2**	**120**	142.29
October 2018 ISCO			
January 2019	<0.12	**130**	142.10
February 2019 ISCO			
April 2019	<0.12	**96**	142.96
July 2019	<0.12	92	141.70
October 2019	<0.12	**150**	141.63
January 2020	<0.52	5.9	140.97
March 2020	<0.52	3.6	140.50

MW-6 (down gradient- off site)
Total Depth of well: 165 feet. Screened 125-165 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard 94 µg/L	Depth to Water (feet)
September 2018	<5.0	3.4	145

MW-3 (cross gradient near source)
Total Depth: 165 feet. Screened 125-165 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard 94 µg/L	Depth to Water (feet)
January 2018	1.3	**1,700**	142.48
June 2018	3.3	**2,400**	142.63
October 2018 ISCO			
January 2019	<0.12	**1,600**	142.25
February 2019 ISCO			
April 2019	<0.121	**260**	142.02
July 2019	<0.12	**180**	142.07
October 2019	<0.12	27	141.97
January 2020	<0.52	17	141.35
March 2020	<0.52	**110**	140.88

MW-7 (cross gradient- off site)
Total Depth of well: 165 feet. Screened 125-165 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard 94 µg/L	Depth to Water (feet)
September 2018	<5.0	2.1	145

MW-4 (up gradient)
Total Depth of well: 170 feet. Screened: 126-166 feet.

Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard 94 µg/L	Depth to Water (feet)
March 2018	0.39	9.7	143.02
June 2018	<0.12	16	143.15
October 2018 ISCO			
January 2019	<0.12	25	142.95
February 2019 ISCO			
April 2019	<0.12	7	142.39
July 2019	<0.12	2.7	142.65
October 2019	<0.12	<0.22	142.41
January 2020	<0.52	<0.52	141.81
March 2020	<0.52	<0.52	141.38

MW-5 (up gradient- Northeast corner of property)
Total Depth of well: 165 feet. Screened 125-165 feet.

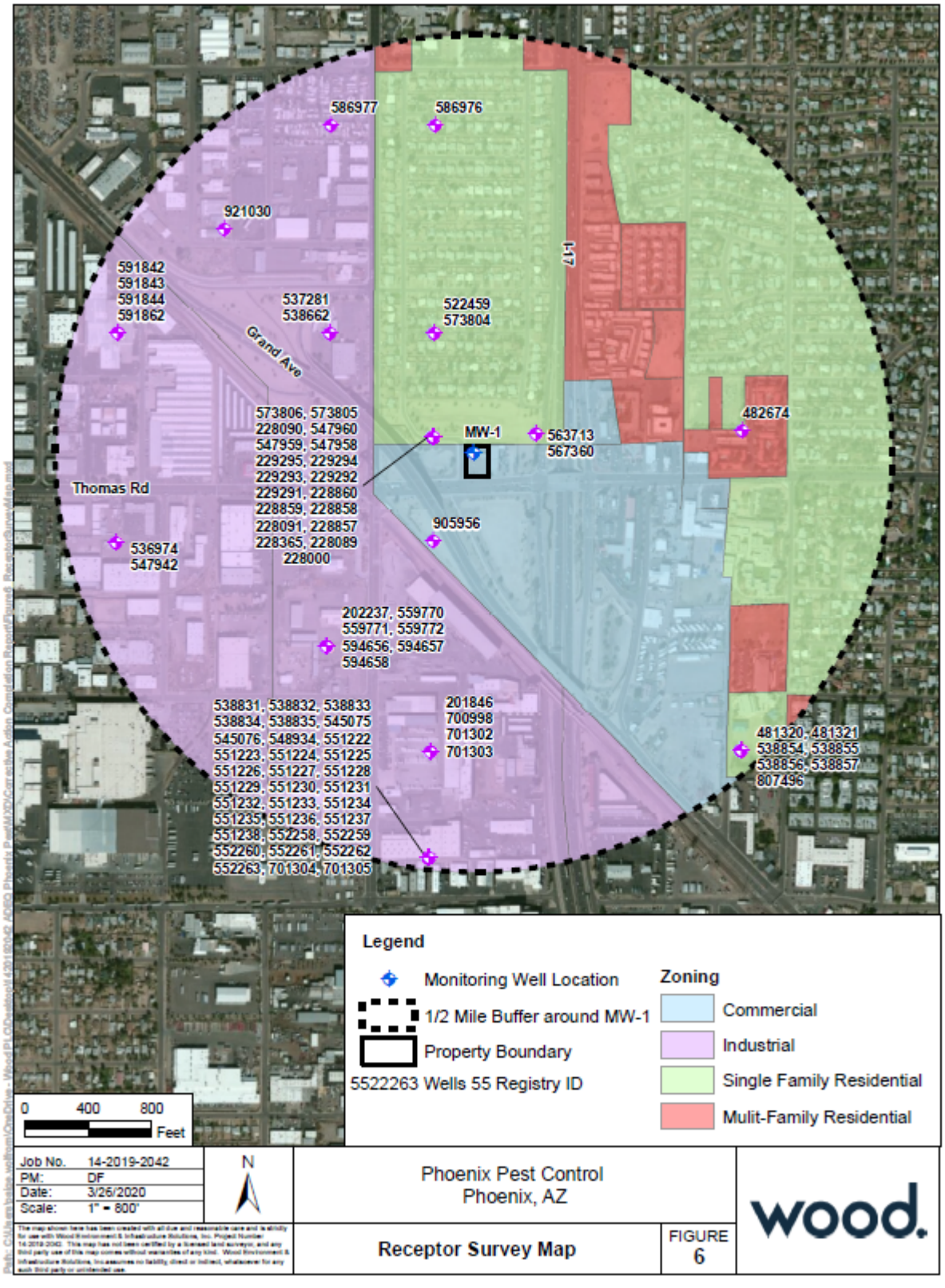
Date	Benzene AWQS is 5.0 µg/L	MTBE Tier 1 Corrective Action Standard 94 µg/L	Depth to Water (feet)
September 2018	<0.12	15	148

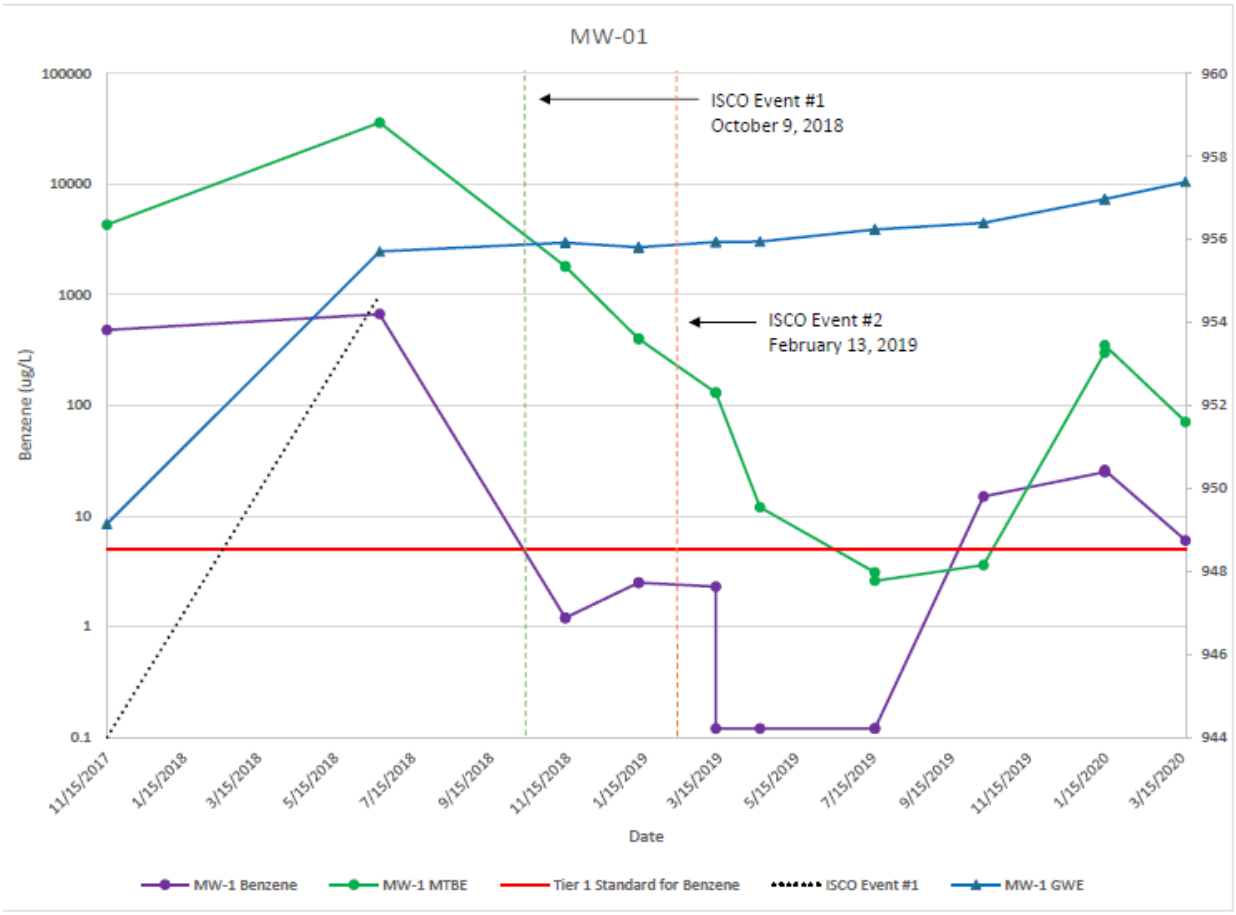

Retention Basin
Verde Ln
Retention Basin
20th Ave
Extreme Auto Body & Paint
I-17
Thomas Rd
Grand Ave
Retention Basin
0 75 150
Feet
Legend
Site Location
Job No. 14-2019-2042
PM: DF
Date: 3/24/2020
Scale: 1" = 150'
N
Phoenix Pest Control
Phoenix, AZ
Site Vicinity Map
FIGURE
2
wood.

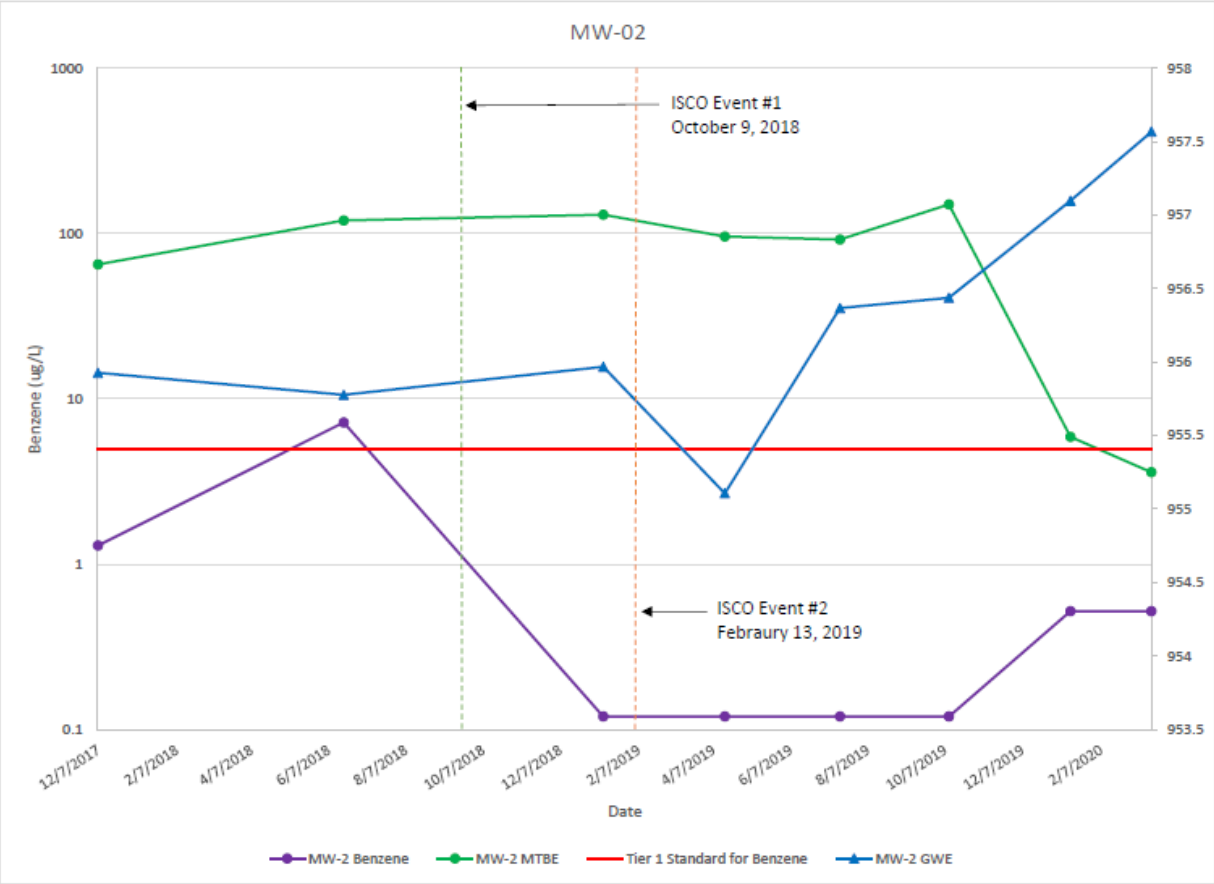

MW-7
MW-3
MW-5
IW-3
SB-7
SB-4
SB-5
IW-4
MW-1
MW-2
IW-2
IW-1
SB-2
MW-4
Extreme Auto Body & Paint
SB-6
26th Ave
MW-6
Legend
Monitoring Well Location
ISCO Well Location
Soil Boring Location
Structure Location
Underground Storage Tank
Property Boundary
0 25 50
Feet
N
Job No. 14-2019-2042
PM: DF
Date: 3/24/2020
Scale: 1" = 50'
Phoenix Pest Control
Phoenix, AZ
Site Plan Map
FIGURE
3
wood.

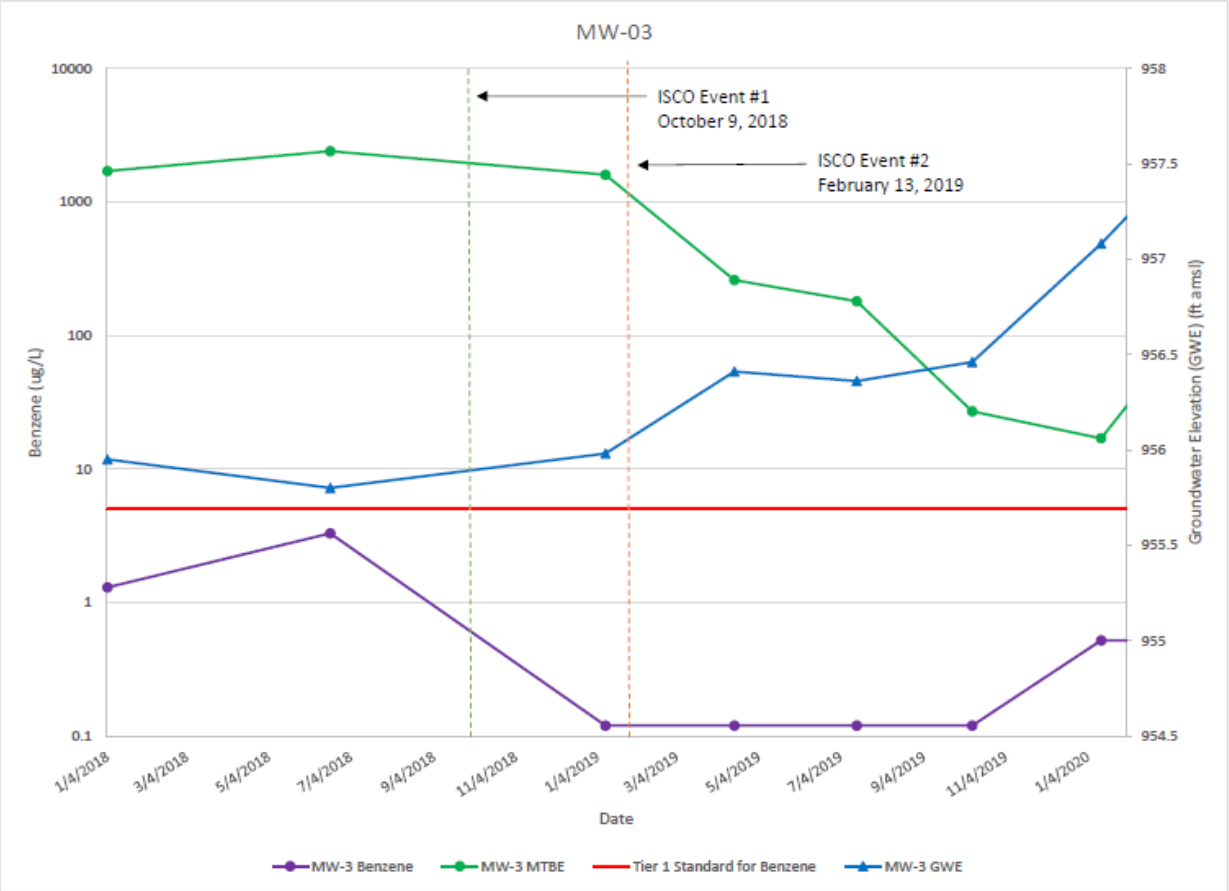

MW-3
957.55
IW-3
957.51
IW-4
957.55
MW-1*
957.39
MW-2*
957.57
IW-1
957.39
IW-2*
956.91
MW-4
957.54
957.55
957.55
957.45
957.50
957.55
26th Ave
Thomas Rd
Extreme Auto Body & Paint
Legend
Monitoring Well Location
ISCO Well Location
Soil Boring Location
Structure Location
Underground Storage Tank
Property Boundary
Notes:
MW-4 Well Identification
957.54 Water Level Elevation ft. AMSL
ft. AMSL Feet above Mean Sea Level
* Wells were removed from groundwater contours due to anomalous groundwater elevation measurements.
0 25 50
Feet
N
Job No. 14-2019-2042
PM: DF
Date: 3/31/2020
Scale: 1" = 50'
Phoenix Pest Control
Phoenix, AZ
Potentiometric Map
FIGURE
4
wood.

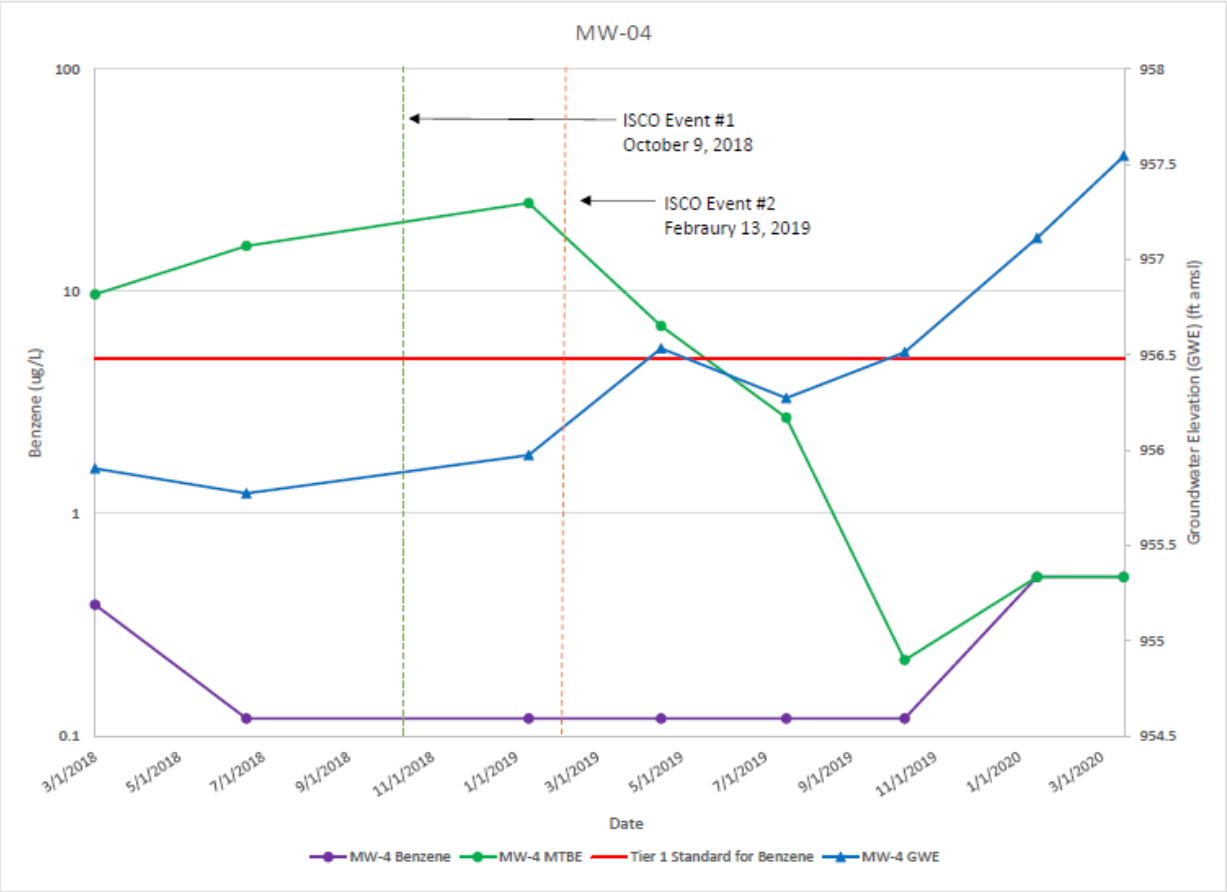

MW-3
<0.52
110
IW-3
<0.52
47
IW-4
<2.6
46
MW-1
6 DJ
71
MW-2
<0.52
3.6
IW-1
<0.52
<0.52
IW-2
<0.52
<0.52
MW-4
<0.52
<0.52
Extreme Auto
Body & Paint
26th Ave
Thomas Rd
Legend
Monitoring Well Location
ISCO Well Location
Structure Location
Underground Storage Tank
Property Boundary
Analyte Concentration in Groundwater
(Dashed Where Inferred)
Benzene, 5 µg/L
MTBE, 20 µg/L
Notes:
MW-3 Well Identification
<0.52 Benzene concentrations in µg/l
110 MTBE concentrations in µg/l
µg/L Microgram per liter
MTBE Methyl tert-butyl ether
DJ The analyte sample required dilution and the result was estimated
0 25 50
Feet
N
Job No. 14-2019-2042
PM: DF
Date: 3/31/2020
Scale: 1" = 50'
Phoenix Pest Control
Phoenix, AZ
Benzene and MTBE Concentrations
FIGURE
5
wood.


586977
586976
921030
591842
591843
591844
591862
537281
538662
522459
573804
I-17
Grand Ave
573806, 573805
228090, 547960
547959, 547958
229295, 229294
229293, 229292
229291, 228860
228859, 228858
228091, 228857
228365, 228089
228000
MW-1
563713
567360
482674
Thomas Rd
905956
536974
547942
202237, 559770
559771, 559772
594656, 594657
594658
538831, 538832, 538833
538834, 538835, 545075
545076, 548934, 551222
551223, 551224, 551225
551226, 551227, 551228
551229, 551230, 551231
551232, 551233, 551234
551235, 551236, 551237
551238, 552258, 552259
552260, 552261, 552262
552263, 701304, 701305
201846
700998
701302
701303
481320, 481321
538854, 538855
538856, 538857
807496
Legend
Monitoring Well Location
1/2 Mile Buffer around MW-1
Property Boundary
5522263 Wells 55 Registry ID
Zoning
Commercial
Industrial
Single Family Residential
Mulit-Family Residential
0
400
800
Feet
Job No. 14-2019-2042
PM: DF
Date: 3/26/2020
Scale: 1" = 800'
N
Phoenix Pest Control
Phoenix, AZ
Receptor Survey Map
FIGURE
6
wood.


MW-01
ISCO Event #1
October 9, 2018
ISCO Event #2
February 13, 2019
Benzene (ug/L)
100000
10000
1000
100
10
1
0.1
960
958
956
954
952
950
948
946
944
11/15/2017
1/15/2018
3/15/2018
5/15/2018
7/15/2018
9/15/2018
11/15/2018
1/15/2019
3/15/2019
5/15/2019
7/15/2019
9/15/2019
11/15/2019
1/15/2020
3/15/2020
Date
MW-1 Benzene
MW-1 MTBE
Tier 1 Standard for Benzene
ISCO Event #1
MW-1 GWE


MW-02
ISCO Event #1
October 9, 2018
ISCO Event #2
Febraury 13, 2019
Benzene (ug/L)
1000
100
10
1
0.1
958
957.5
957
956.5
956
955.5
955
954.5
954
953.5
12/7/2017
2/7/2018
4/7/2018
6/7/2018
8/7/2018
10/7/2018
12/7/2018
2/7/2019
4/7/2019
6/7/2019
8/7/2019
10/7/2019
12/7/2019
2/7/2020
Date
MW-2 Benzene
MW-2 MTBE
Tier 1 Standard for Benzene
MW-2 GWE


MW-03
ISCO Event #1
October 9, 2018
ISCO Event #2
February 13, 2019
Benzene (ug/L)
Groundwater Elevation (GWE) (ft amsl)
Date
10000
1000
100
10
1
0.1
958
957.5
957
956.5
956
955.5
955
954.5
1/4/2018
3/4/2018
5/4/2018
7/4/2018
9/4/2018
11/4/2018
1/4/2019
3/4/2019
5/4/2019
7/4/2019
9/4/2019
11/4/2019
1/4/2020
MW-3 Benzene
MW-3 MTBE
Tier 1 Standard for Benzene
MW-3 GWE


MW-04
ISCO Event #1
October 9, 2018
ISCO Event #2
Febraury 13, 2019
Benzene (ug/L)
Groundwater Elevation (GWE) (ft amsl)
100
10
1
0.1
958
957.5
957
956.5
956
955.5
955
954.5
3/1/2018
5/1/2018
7/1/2018
9/1/2018
11/1/2018
1/1/2019
3/1/2019
5/1/2019
7/1/2019
9/1/2019
11/1/2019
1/1/2020
3/1/2020
Date
MW-4 Benzene
MW-4 MTBE
Tier 1 Standard for Benzene
MW-4 GWE